LVV Auto Consultants Pte Ltd

Company Registration No. 199607198R

51 UBI AVE 1, #01-25 PAYA UBI INDUSTRIAL PARK, SINGAPORE 408933 TEL : (065) 62563561 FAX : (065) 67414108

Your Ref: TP/IP/28005/2018
Our Ref : CI/TPD18011340/Z

17th August 2018

General Investigation Team 'A'
Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF MOTOR BUS SBS 8360J

1. We refer to your request on 16th May 2018 to conduct a physical inspection of a motor bus bearing registration number SBS 8360J (herein referred to as "**Motor Bus**"), which was involved in a road traffic accident on 11th May 2018.

2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Bus that may have contributed to the accident.

3. Following the request, we had carried out a physical inspection of the Motor Bus on 14th June 2018 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. We now set out below our observations and comments with respect to this inspection.

General Condition

4. The mileage of the Motor Bus at the time of our inspection was recorded as 884906km.

5. The Motor Bus was observed to have sustained damages at its frontal portion. Its front lower bumper was observed to be dislodged; its front left & right headlamp was observed to be damaged; its entire windshield was observed to shattered, dislodged & missing from the original installation; its dashboard was pushed inwards towards the rear of the Motor Bus; the driver's window glass was found shattered & missing; its front floor board near the front passenger door was corrugated; misalignment of the front passenger door was noted at time of our inspection.

6. The damages were consistent with the accidents case fact that the Motor Bus collided head to rear with a stationary SMRT Motor Bus hence sustained with such damages mentioned. See photo 1 – 7 below.

Photo 1 shows a general view of the front body of the Motor Bus at the time of our inspection. The Motor Bus was observed to have sustained damages at its front portion as a result of the accident's collision.

Photo 2 shows a general view of the rear portion of the Motor Bus at the time of our inspection. The Motor Bus was observed to be in good condition unaffected by the accident. The rear bumper was dismantled for towing purposes.

Photo 3 shows a close-up view of the front left body of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damages due to the accident's impact.

Photo 4 shows a close-up view of the front right body of the Motor Bus at the time of our inspection. The Motor Bus was observed to sustained damages due to the accident's impact.

Photo 5 shows a close-up view of the dismantled rear bumper from the Motor Bus.

Photo 6 shows a close-up view of the Motor Bus's dashboard that was observed to be damaged due to the accident's impact.

Photo 7 shows a close-up view of the Motor Bus's floor board next to the front passenger's glass door that was observed to be damaged due to the accident's impact.

Tyres and Wheel Rims

7. The 6 tyres fitted on the Motor Bus were all observed to be in serviceable condition and sufficiently inflated for vehicular operation. We did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The tyre brand, tyre size and remaining tread depth of the Motor Bus's 6 tyres were recorded as follows:-

8. The 6 tyres were observed to be wrapped around standard alloy wheel rims that were found to be without any damage. See photo 8 – 11 below.

Photo 8 shows the condition of the front right tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 8mm. The tyre was also observed to be sufficiently inflated for vehicular operation.

Photo 9 shows the condition of the front left tyre of the Motor Bus, which was observed to be in serviceable condition with remaining tread depth of approximately 9mm. The tyre was also observed to be sufficiently inflated for vehicular operation.

Photo 10 shows the condition of the rear right tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 6mm. The tyres, which were wrapped around standard alloy wheels rims, were also observed to be sufficiently inflated for vehicular operation.

Photo 11 shows the condition of the rear left tyres of the Motor Bus, which were observed to be in serviceable condition with remaining tread depth of approximately 8mm. The tyres, which were wrapped around standard alloy wheel rims, were also observed to be sufficiently inflated for vehicular operation.

Engine Compartment & Operating Fluids

9. Upon examination of the engine compartment of the Motor Bus, we had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The engine oil and steering fluid were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.

10. Further examination of the engine compartment revealed no sign(s) or indication(s) of fluid leakage and/or fluid stain within the engine compartment of the Motor Bus.

11. Our subsequent checks on the underside of the Motor Bus reveals some fluid stain sighted under the engine compartment. Further investigation found that the fluid stain was a pre-existed prior the accident & not a fresh fluid. This was due to some dirt observed on the fluid stain. Conclusively, it is not likely to be related to the accident. Visually, the various undercarriage components of the Motor Bus were observed to be intact and without any visible damage except for the damages caused by the accident. See photo 12 – 17 below.

Photo 12 shows the engine compartment of the Motor Bus was located at the rear of the Motor Bus.

Photo 13 shows the engine undercarriage of the Motor Bus. Some pre-existed fluid was observed at time of our inspection.

Photo 14 shows the steering fluid of the Motor Bus. It was observed to be of sufficient level without any contamination at time of our inspection.

Photo 15 shows the engine coolant cylinder of the Motor Bus. It was observed to be of sufficient level without any contamination at time of our inspection.

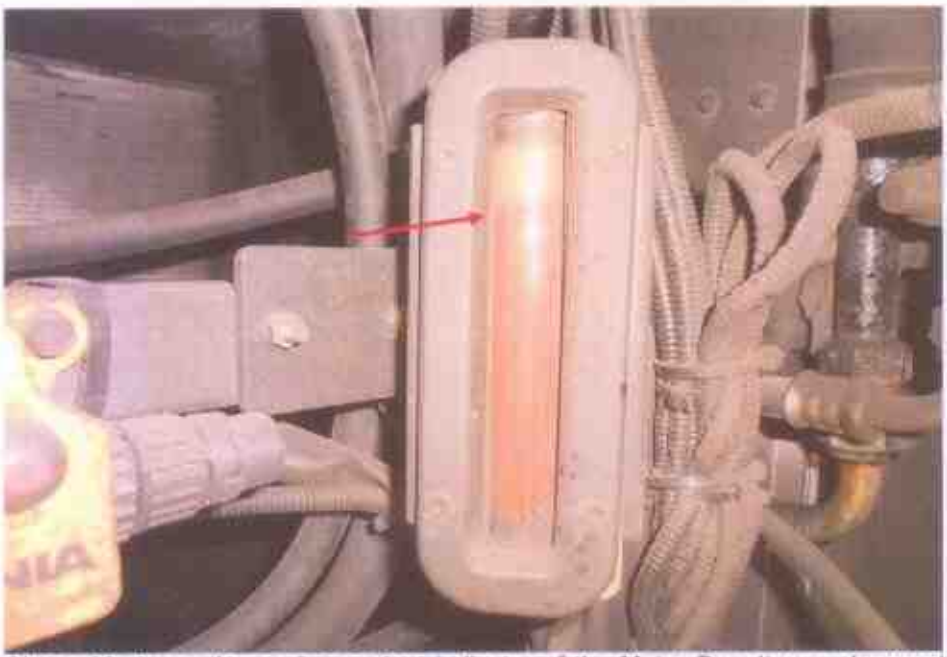

Photo 16 shows the engine coolant indicator of the Motor Bus. It was observed to be of sufficient level without any contamination at time of our inspection.

Photo 17 shows the engine fluid on the dip stick of the Motor Bus. It was observed to be of sufficient level without any contamination at time of our inspection.

Steering System & Braking System

12. The mechanical components of the Motor Bus's steering system were all found to be visually intact and undamaged. Static test on the steering system of the Motor Bus also revealed no abnormality to the steering system. We did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. Our visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photo 18 & 19 below.

Photo 18 shows some of the mechanical components (arrowed) of the Motor Bus's steering system. Our visual check on the various mechanical components of the steering system revealed all to be intact and in good condition. The steering system of the Motor Bus likely to be in serviceable condition at the time of accident.

Photo 19 shows the undercarriage components at the front steering system of the Motor Bus. The various undercarriage components of the Motor Bus were all observed to be intact and without any visible damage. This had included the steering rack and steering ball joints (arrowed) of the Motor Bus, which were observed to be securely attached to the front left wheel and front right wheel.

13. The braking system of the Motor Bus was noted to be of a full air-assisted braking system. Briefly, in this system, compressed air is used to press onto the brake shoes (for drum brakes) or onto the brake pads (for disc brakes), through the respective braking mechanism, thus slowing the rotation of the wheels.

14. 2 numbers of air tanks in particular were observed to be also in serviceable condition. Air built up to the fullest level which is level 10 (On the display panel) for both air tanks for operational ready status after a warming up session prior the operational test. Both air tanks were monitored for about 10 minutes for an observation of any abnormalities. Both air tanks pressure found to be normal without any drop in pressure during the course of our monitoring session. This would indicate that there was no leak of air pressure from the air braking system of the Motor Bus. See photo 20 below.

Photo 20 shows pressure tank 1 & tank 2 were observed to be pressurised up to 10bars after the engine start-up. No drop in the pressure after a few minutes which means there's no air leakage from the air-braking system.

15. Static brake tests conducted on the Motor Bus revealed no abnormality. The brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Motor Bus. The braking system of the Motor Bus was likely to be in serviceable condition at the material time of our inspection.

16. In general, our visual inspection of the mechanical components of the Motor Bus's braking system appear to suggest that its braking system was in serviceable condition at the material time of accident. See photo 21 - 23 below.

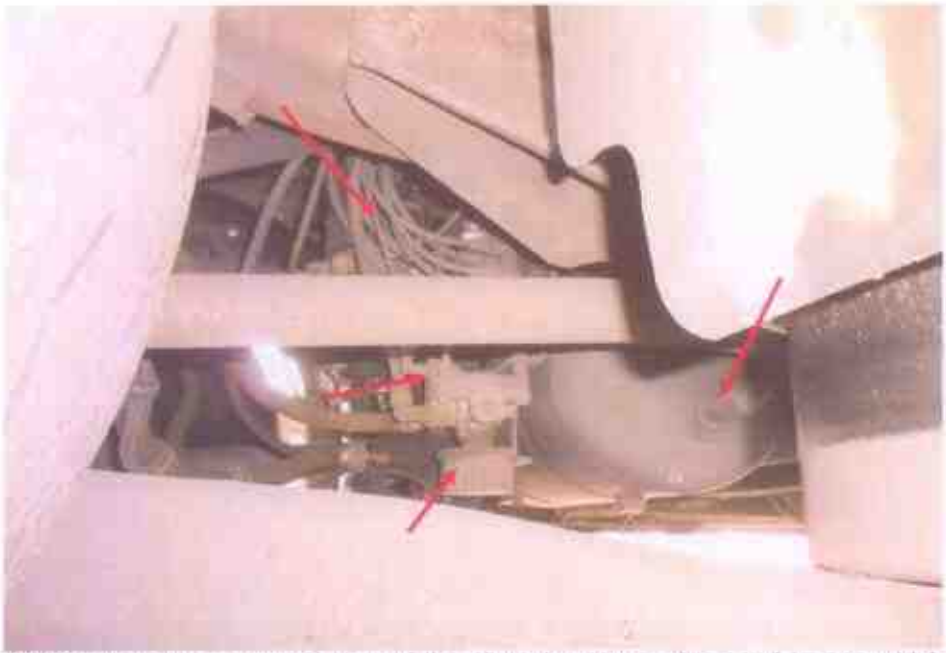

Photo 21 shows a general view of the air tank, valves, pipes and hoses, which are some of the components for the air-assisted braking system of the Motor Bus. This was at the underside of the Motor Bus's body. There were no damages observed at time of our inspection.

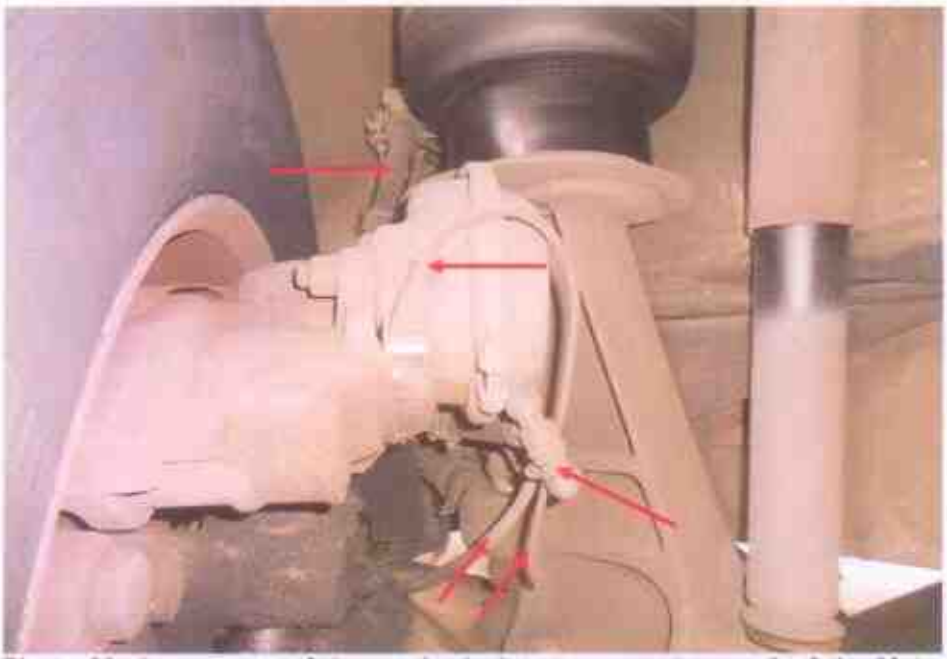

Photo 22 shows some of the mechanical components (arrowed) of the Motor Bus's braking system. Our visual check on the various mechanical components revealed all to be intact and in good condition. It was in serviceable condition at the time of accident.

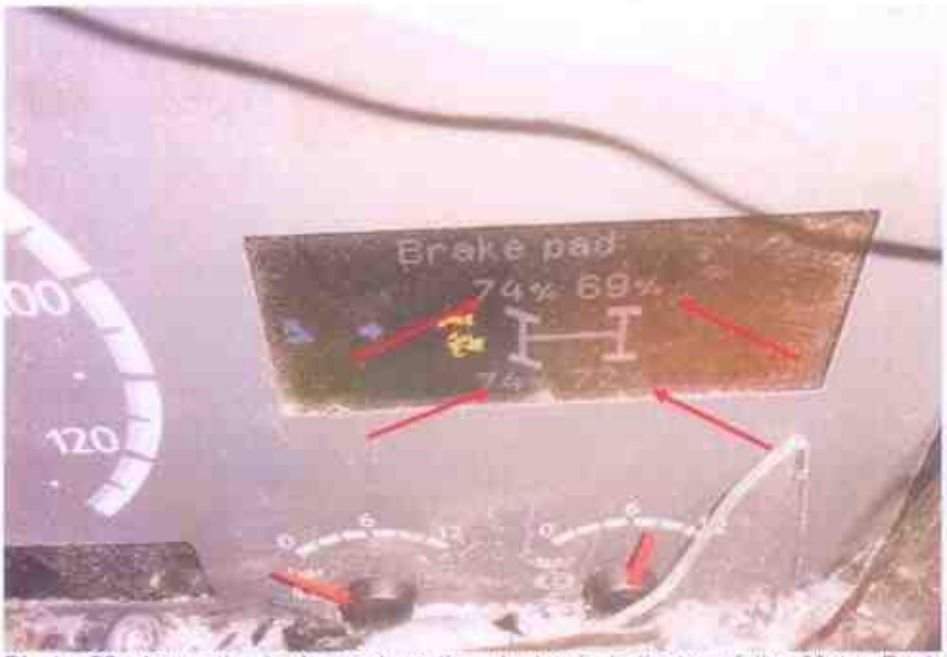

Photo 23 shows the brake pad on the electronic indicator of the Motor Bus's braking system. It shows the material percentage of the brake pad which indicating an acceptable range on the frictional material prior the accident.

Electronic Safety / Operational indicators

17. The Motor Bus's automatic self-test of the functionality of its various electronic operating systems like the Battery checked indicator, engine checked indicator, Anti-Locking Braking System ABS indicator, Parking light indicator & Diesel Particulate Filter Warning. During cranking of the engine had indicated that these systems were in working condition and without abnormality. This can be established from the warning lights disappearing from the instrument panel after the self-test. See photo 24 & 26 below.

Photo 24 shows the warning lights for the various electronic operating systems of the Motor Bus appearing on its instrument panel during the self-test when the engine was cranked.

Photo 25 shows the indicators at the driver's seat, these systems were in working condition. This can be established from the warning lights disappearing from the instrument panel after the self-test. However, only the Anti-Locking Braking System (ABS) stayed lighted up amongst others.

Photo 26 shows the operational selectors at the driver's seat. It was observed to be unaffected by the accident's collision. Hence enabling an operational test to be conducted via activating the selectors.

Operational Behaviour of the Motor Bus

18. A short operational test of the Motor Bus, to primarily determine whether there was any abnormality to its various operating systems like its engine system, its transmission system, steering system and braking system was subsequently carried out by SBS representative. The test was conducted by driving the Motor Bus forward, stopping, before reversing and coming to a stop again.

19. During the operational test, the various transmission gears of the Motor Bus were able to be engaged without any difficulty by manually shifting the gear selector. There were no abnormal sounds heard and/or abnormal behaviour of the Motor Bus's engine system. It was able to move forward and backward normally. The braking system was found to be in working condition as the Motor Bus was able to slow down and come to a complete stop upon depressing of the brake pedal. See photo 27 & 28 below.

Photo 27 shows the SBS driver while conducting the operational test.

Photo 28 shows the operational test on the Motor Bus. SBS driver were able to move the Motor Bus forward, backward, turning left & right & stopping without any abnormalities.

Conclusion

20. From our physical inspection of the Motor Bus, it appears that its engine system, steering system, braking system and transmission system were all in serviceable condition. We did not find any evidence(s) to suggest that there was possible mechanical failure to the Motor Bus that may have caused and/or contributed to the accident. This is also taking into consideration that the operational test of the Motor Bus, which we had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its various operating systems.

21. The observation gathered from our physical inspection of the Motor Bus had indicated no evidence to suggest possible mechanical failure to the Motor Bus that may have contributed to the accident.

22. The 6 tyres fitted on the Motor Bus were also found to be in serviceable condition. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The 6 tyres were sufficiently inflated for vehicular operation with remaining tread depth of approximately 6mm to 9mm each.

Rohaizal A. Rahim
Technical Investigator

Ang Bryan Tani
AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA
Senior Technical Investigator
Technical Investigation & Reconstructionist (SAE-A)